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Golovinomyces clematidis sp. nov. from China

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Abstract — *Golovinomyces clematidis* (*Erysiphaceae*), a new species found on *Clematis aethusifolia* (*Ranunculaceae*) in Inner Mongolia, China, is described, illustrated, and compared with morphologically similar species of the *G. cichoracearum* s. lat. complex.

Key words — *Erysiphales*, powdery mildews, taxonomy

Introduction

Some interesting specimens of powdery mildew on *Clematis aethusifolia* (*Ranunculaceae*) were collected in Ulanqab City, Inner Mongolia Autonomous Region, in northern China in 2005 and 2012. This was unusual as the first ranunculaceous host plant reported to be infected by a species of *Golovinomyces* (U. Braun) Heluta (Braun 1987; Chen et al. 1987; Nomura 1997; Shin 2000; Liu 2010; Braun & Cook 2012). Based on its ellipsoid-ovoid, doliiform to subcylindrical, non-limoniform conidia as well as relatively short and cylindrical conidiophores, this fungus should be treated as a new species of *Golovinomyces* sect. *Golovinomyces* (Braun & Cook 2012). It is morphologically close to the *G. cichoracearum* (DC.) Heluta s. lat. complex, a widespread powdery mildew fungus on hosts of *Asteraceae* (Braun & Cook 2012).

Materials & methods

The fungal materials were mounted in distilled water and examined using standard light microscopy without staining. For each collection, 100 conidia and related structures were measured in water. The specimens were deposited in the Mycological Herbarium of Chifeng University, Inner Mongolia, China (CFSZ), the Mycological Herbarium of the Institute of Microbiology, Academia Sinica, Beijing, China (HMAS), and the Herbarium of Martin-Luther-University, Halle (Saale), Germany (HAL).

Taxonomy

Golovinomyces clematidis T.Z. Liu & Jing Wen, **sp. nov.** Fig. 1

MycoBank MB 805351

Differs from *Golovinomyces cichoracearum* s. str. and *G. orontii* by its longer conidiophores, which are consistently straight at the base of foot-cells, and its smaller conidia.

Type: On living leaves of *Clematis aethusifolia* Turcz. (*Ranunculaceae*): China, Inner Mongolia, Ulanqab City, Xinghe County, Datongyao, 24 Aug. 2012, T.Z. Liu, Z.H. Jia & D.N. Su (**Holotype**, CFSZ 5940; **isotypes**, HMAS 244659, HAL 2591 F).

Etymology: derived from the generic name of the host plant.

Mycelia on stems and leaves amphigenous, effuse or forming irregular white patches, often occupying the whole leaf surface, persistent or subevanescent. Hyphae 4.5–7.5 μm wide, hyaline to yellowish, thin-walled, smooth or rarely verruculose. Appressoria distinctly nipple-shaped. Conidiophores erect, 100–200 μm long, foot-cells cylindrical, straight or occasionally somewhat flexuous, 55–100 × 8–12.5 μm, followed by 2–3 shorter cells. Conidia in chains (catenescent), ellipsoid-ovoid, doliiform to subcylindrical, relatively small, 20–34 × 10–15 (average 25 × 13) μm. Chasmothecia scattered to gregarious, dark brown, subglobose, 80–130(–140) (average 105) μm diam. Peridium cells irregularly polygonal to daedaleoid, 7.5–25 μm diam. Appendages numerous, about 15–70 or more, usually equatorial and in the lower half of the chasmothecium, sometimes reaching the upper half, mycelium-like, often interlaced with mycelia and with each other, mostly unbranched or rarely irregularly branched one time, flexuous, sometimes tortuous to geniculate, (0.5–)1–5 times as long as the chasmothecial diam., (50–)100–550 μm long, (2.5–)4–10 μm wide, thin-walled, smooth, somewhat rough near the base, (0–)1–9-septate, brown throughout or in the basal half, paler towards the apex, hyaline in the upper portion. Asci 8–22, oval, oblong-oval or irregularly shaped, mostly stalked, sometimes sessile, 40–75 × 20–40 (average 59 × 29.5) μm. Ascospores 2(–3) per ascus, ellipsoid or ovoid, yellowish, (15–)20–25 (–30) × (10–)12.5–15(–17.5) (average 23 × 14) μm.

Additional specimen examined: On living leaves of *Clematis aethusifolia*: **China**, **Inner Mongolia**, Ulanqab City, Jining District, Laohushan, 16 Oct. 2005, T.Z. Liu (CFSZ 05392).

Comments: *Golovinomyces clematidis* is the first *Golovinomyces* species to be collected on a host belonging to the *Ranunculaceae*. Hence, there are no comparable species on allied hosts. *Golovinomyces clematidis* is morphologically similar to species of the *G. cichoracearum* s. lat. complex including their chasmothecium size, appendage number and characteristics, and number and size of asci and ascospores (Braun & Cook 2012). However, species of this complex are specialized and confined to certain hosts belonging to particular tribes of the *Asteraceae*, i.e., they are characterized by a close co-evolution with their hosts (Matsuda & Takamatsu 2003, Braun & Cook 2012). The plurivorous *G. orontii* (Castagne) Heluta is one exception that might have the potential to cause powdery mildew on *Clematis*, but it is easily distinguished by the

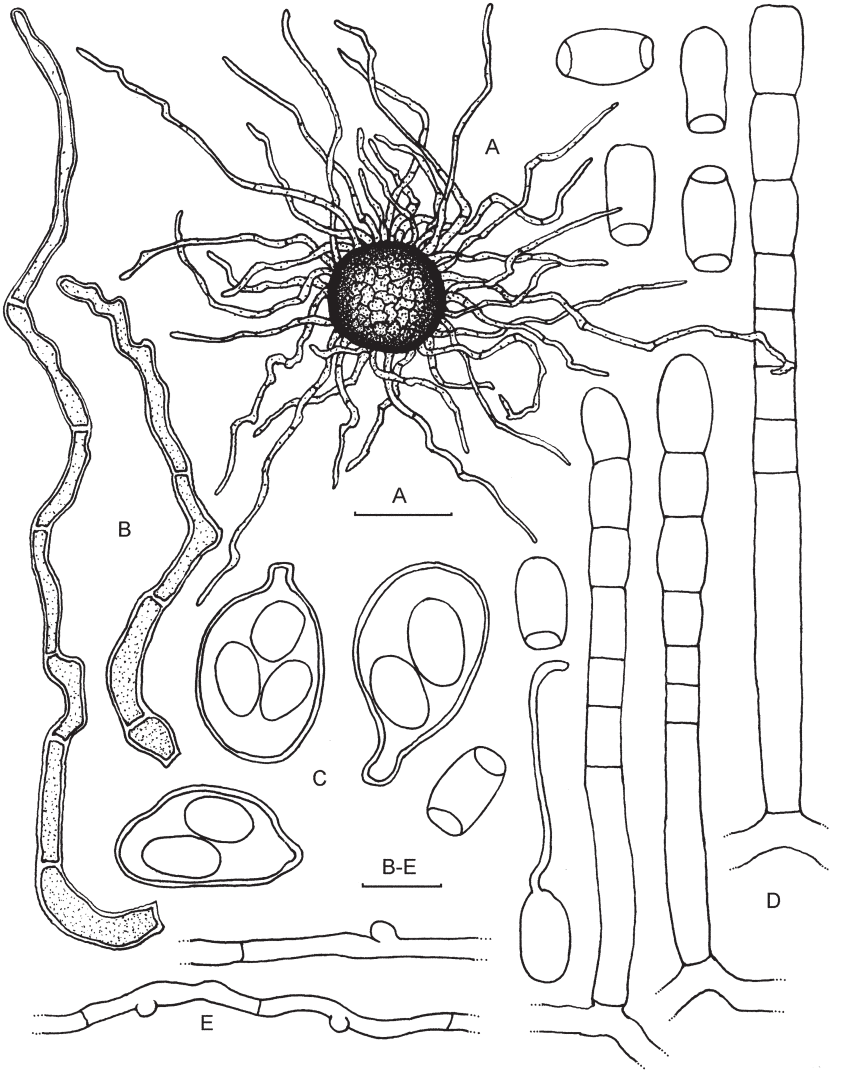

Figure 1. *Golovinomyces clematidis* (holotype). A. Chasmothecia; B. Appendages; C. Asci and ascospores; D. Conidiophores and conidia; E. Hyphae and appressoria. Scale bars: A = 100 μm; B–E = 25 μm. T.Z. Liu del.

frequently curved base of its conidiophore foot-cells (Liu 2010, Braun & Cook 2012). *Golovinomyces cichoracearum* s. str. also differs in its curved to sinuous conidiophore foot-cells that are both shorter and wider ((30–)40–80 × (9–)10–

15(–18) µm) as well as much larger conidia (25–42 × 14–23 µm). The conidia of *G. clematidis* differ significantly from all other species of the *G. cichoracearum* complex. One specimen of *G. clematidis* (CFSZ 05392) has previously been identified as and confused with *Erysiphe aquilegiae* var. *ranunculi* (Grev.) R.Y. Zheng & G.Q. Chen (Liu 2010).

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